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Infection Control In Orthopaedic Surgery

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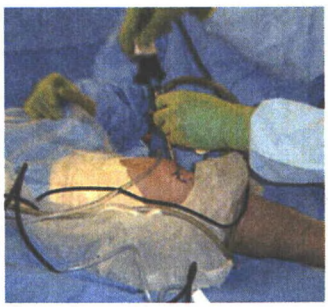

What is the latest best practice on reducing surgical site infection in orthopaedic surgery? ANDREW BRISTER reports on the findings from a recent symposium.

One infection is one too many, ran the slogan behind Ethicon's Surgical Site Infection Symposium at the ICC, Birmingham. There can be no doubting that hospitals across the country are committed to doing all they can to stop infection, yet lives continue to be blighted by surgical site infections, resulting in extended hospital stays for patients and huge costs for the NHS. Estimates put the cost of healthcare associated infections Europe-wide at Z6.3 million each year, with patients spending, on average, an extra 6.5 days in hospital. A 10% reduction in the infection rate could save Z150 m every year, more than 360,000 bed days and nearly 48,000 consultant sessions. The symposium brought together leading experts in the field of surgical site infection, and featured two presentations looking at orthopaedic surgery, where 'taking responsibility for infection' was the order of the day. Rhidian Morgan-Jones, a consultant at the University Hospital of Wales and Cardiff, said: "As surgeons we need to put our hands up and admit that we cannot blame the patient, we cannot blame the theatre, or theatre staff. Surgeons need to take responsibility for infection too and this should provide a good building block to improve our practices." One of Mr Morgan-Jones' specialisms is knee replacement and revision of failed knee replacements. "There are 70,000 knee replacements per year in the UK. Deep infection rates can vary from 0.5% to up to 2%. On average, this results in 700 cases of serious infection each year in knee replacements alone." So, what measures can be taken to avoid infection? Mr Morgan-Jones suggests that one solution is not to operate. He explained his reasoning: "Every time you operate there is a risk of infection." He offered the audience an example, using the case of a low energy break in the tibia, where a surgeon had made the decision to operate, inserting metalwork into the leg. The patient subsequently suffered from an infection. Mr Morgan-Jones suggested that, in this case, the bone would have healed without the need for surgical intervention if it had simply been left in plaster. In cases where surgery is unavoidable, Mr Morgan-Jones advised that tourniquets should be used for the shortest time possible suggesting that, for a knee replacement, a tourniquet should not be on for more than an hour, lessening the risk of infection. He also advised Trusts to consider moving to disposable single-use tourniquets. "Sometimes you do not have to use tourniquets on certain knee operations," said Mr Morgan-Jones. "I use them because I like to have a bloodless field when I am working or cementing. However, they should not be used if the patient has a vascular disease."

Surgical technique

Surgical techniques will also have an impact on infection. "We went through a phase of minimally-invasive surgery," said Mr Morgan-Jones. "The wounds were worse, the positions of the implants were worse and we have now moved away from this type of surgery. Small incisions should be an outcome of good surgery; it should not be a primary goal." Mr Morgan-Jones and his team at Cardiff have pioneered a tibial crest osteotomy with a suture technique that eliminates the need for screws or wires which can cause their own problems once you close the osteotomy. "This has revolutionised the practice of knee replacement in Cardiff," he said. On sutures, Mr Morgan-Jones recommended that large knots should be minimised and absorbable sutures be used where possible. He also favours antibacterial sutures, such as Vicryl Plus. Staples may be necessary when skin quality is very poor and a suture is not going to hold. "Skin staples produce irritation and compression and can cause superficial infection, although there is no evidence of deep infection," he said. Mr Morgan-Jones now uses the Aquacel absorbent dressing which absorbs and interacts with wound exudates to form a soft, hydrophilic, gas-permeable gel that traps bacteria and conforms to the contours of the wound. "Why Aquacel? It is absorbent. Wounds are going to leak and you want to absorb that leak." Mr Morgan-Jones also has a fiveday rule on dressing changes for knee replacements. "No nurse is allowed to change the dressing within the first five days without prior discussion. Wounds heal if you leave them alone, but not if you take the dressing off to have a look at them. That, more than anything else will increase the risk of infection," he said. "Five days is the length of time before patients are sent home following a knee replacement, so we change the dressing before the patient goes home." There is a significant debate in orthopaedic surgery about thromboprophylaxis and the need for anti-thrombotic drugs. The National Institute for Health and Clinical Excellence (NICE) prescribes the use of oral Factor Xa inhibitors to reduce the rate of pulmonary embolisms (PE). "We have found that these drugs do work. They halved the PE rate, but made no difference to the incidence rate of deep vein thrombosis and doubled the haematoma rate and the return to theatre rate," said Mr Morgan-Jones. "There is an advantage to these drugs and there is a big disadvantage. We need to be careful about following guidelines. As a community in Cardiff, we are starting to move back towards aspirin."

Antibiotics

Antibiotics are another emotive issue. Mr Morgan-Jones warned against reliance on them. He said: "A colleague once said to me: 'Antibiotics will make a third rate surgeon into a second rate one.' Surgeons should not rely on antibiotics to do their job for them. They offer us a useful tool, but are not a substitute for good practice." He favours short course duration – five days intravenously, followed by six weeks orally, with the oral drugs being dual therapy. Mr Morgan-Jones has pioneered a radical single-stage operation for infected knee replacements. "Although two-stage surgery is the standard across the country, we have done nothing but one-stage surgery for the last three years and I would not go back to two-stage." For other types of orthopaedic surgery too, he presented many cases where radical surgery has proved to offer the only solution to long-standing cases of infection. Cleaning of the wound is paramount. Mr Morgan-Jones showed his compartmental debridement technique, reaming from the top to the bottom to clean-up the entire middle of the bone before copiously washing with lavage. Then comes the carbojet, effectively blow drying the wound with carbon dioxide under pressure. This allows any last bits of membrane and biofilm to be more readily removed before washing and drying again until clear. Mr Morgan-Jones also showed his modified Papineau technique for the treatment of chronic open osteomyelitis of the tibia, named after the French-Canadian famed for leaving big wounds open. "I am quite happy to leave the bone exposed," said Mr Morgan-Jones. "If it has a blood supply it will heal. Wounds heal because you have cleaned out the rubbish. We have carried out 15 operations in this way and they have all healed well." Mr Morgan-Jones also called for more work to be done in multidisciplinary teams to deal with orthopaedic infection. "We have to start talking to each other. I don't want to be a one-man band. I need help from the microbiologists, the pharmacists, the radiologists, the dieticians. There has to be teamwork."

Introducing changes

Mike Reed is a consultant orthopaedic surgeon at Northumbria Healthcare (UK), and chairs the Orthopaedic Surgical Site Infection Committee, which has significantly reduced the rates of infections within the Trust. "Infection is like a grief reaction. It is something that we take very seriously, but it is something that we are also in denial about. Denial is the biggest barrier to success in any joint infection reduction programme," said Mr Reed. "We set up the SSI group with a lot of power to make changes. Every deep infection now gets a root cause analysis and far-reaching changes have been implemented." One pre-operative measure is to decolonise patients for all Staphylococcus aureus, not just MRSA. "It is a leap of faith to get management to test for this as well as MRSA but if you can make this happen in your hospitals you will reduce infection rates," said Mr Reed. His findings are backed up by a study in the New England Journal of Medicine in January 2010. "Patient warming is critical", stressed Mr Reed. "The main aim is to keep patients normothermic during and after surgery when the risk is high. Again, this is supported by studies in the New England Journal of Medicine (1996) and The Lancet (2001). We have further introduced pre-warming, via conductive electric blankets, for half an hour prior to surgery." Theatre maintenance is also a significant issue. On the operating table, Mr Reed highlighted the importance of working within the laminar flow afforded by an overhead ventilating canopy. Studies have shown that outside the laminar flow particle counts soar from zero to 600,000 per cubic metre – not surprising when each person sheds some one million skin cells per day. For skin preparation, Mr Reed has moved away from traditional aqueous povidone-iodine to the use of chlorohexidine with alcohol. "If your surgeon is still using iodine plus alcohol then there is a very robust study that shows that they could do better. Read it and ask them about it," advised Mr Reed. Antibiotic choice has proved to be a minefield since Clostridium difficile came along. "We stopped using Cefuroxime, on the insistence of our chief executive, to reduce C. difficile. Yes, we went from three cases per 1,000 of C. difficile to zero, but our infection rate doubled when we went to Gentamicin. There is no hard evidence to tell us what antibiotics we should be using. It is a really difficult problem and we need a trial," urged Mr Reed. It is also difficult to know what to do with dressings, thought Mr Reed. A study by Glasgow's Golden Jubilee Hospital showed that its own Jubilee dressing design achieved a dramatic reduction in blisters, compared to standard dressings. A randomised trial showed a decrease in surgical site infection rates from 3.2% to 0.8%. "That was good enough for me and we changed Trust-wide," said Mr Reed. Like Mr Morgan-Jones, Mr Reed found the issue of thromboprophylaxis to be a great source of contention. "We changed to Rivaroxaban from Tinzaparin and found that returns to theatres from wound complications more than doubled," said Reed. Studies at 10 other hospitals have also shown an increase in wound complications from Rivaroxaban. "We would rather use aspirin, but NICE guidelines constrain us." In treatment rooms, Northumbria has installed small boxes that suck air in, shine UV light to sterilise it and blow the air back out again. "A randomised trial showed a significant reduction in colony counts in treatment rooms. Apparently, they are also effective on C. difficile, although we did not test for that," said Mr Reed. Overall, Mr Reed admits that the strategy needed some tweaks along the way. For example, on pre-warming it took the team a while to move to conductive fabric from forced air warming. Mr Reed's studies with tiny air bubbles on a mock-up theatre proved that forced air warming interferes with the laminar flow from the clean air canopy. Infection rates have significantly improved at the Trust since implementing these measures, but Mr Reed is not resting on his laurels. The latest steps are looking at improved technique, with audited analysis of surgeons. The team is also conducting a randomised trial on the use of ordinary cement versus high dose antibiotic cement in hip fracture hemiarthroplasty. Interim results have shown a very significant reduction in superficial infection rates, down from 2.9% to zero, but no significant reduction in deep infection rates (2.9% to 2.1%). A randomised trial of Vicryl Plus is also being carried out.

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Centenary Pavilion, Elland Road Stadium, Leeds
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